

# PATENT COOPERATION TREATY

TRANSLATION

From the  
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing  
(day/month/year)

Applicant's or agent's file reference

**M0428-OH403**

**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

**PCT/JP2004/016581**

International filing date (day/month/year)

**09.11.2004**

Priority date (day/month/year)

**07.01.2004**

International Patent Classification (IPC) or both national classification and IPC

Applicant

**MITSUI MINING & SMELTING CO., LTD.**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP

Authorized officer

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Telephone No.

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Box No. I

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
☐ This opinion has been established on the basis of a translation from the original language into the following language  
\_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material  
☐ a sequence listing  
☐ table(s) related to the sequence listing
  - b. format of material  
☐ in written format  
☐ in computer readable form
  - c. time of filing/furnishing  
☐ contained in the international application as filed.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims	5, 7, 10, 12, 14, 16-18	YES
	Claims	1-4, 6, 8-9, 11, 13, 15	NO
Inventive step (IS)	Claims	10, 14, 16-18	YES
	Claims	1-9, 1-13, 15	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims		NO

**2. Citations and explanations:**

Document 1: JP 8-50922 A (Canon Inc.), 20 February 1996, claims; Par. Nos. 0038, 0041, 0050-0059, 0131, Fig. 3

Document 2: JP 2002-289178 A (Sanyo Electric Co., Ltd.), 04 October 2002, claims

Document 3: JP 2003-208889 A (Matsushita Electric Industrial Co., Ltd.), 25 July 2003, claims; Par. Nos. 0010-0011

The inventions of claims 1-4, 6, 8-9, 11, 13, 15 do not appear to be novel or to involve an inventive step based on document 1 cited in the ISR.

Document 1 (Par. No. 0041) discloses the negative electrode of a lithium secondary battery arranged with a metallic element not forming an alloy with lithium on the front and rear surfaces of a member containing a metallic element forming an alloy with lithium, and that it is possible to prevent loss of the member containing a metallic element forming an alloy with lithium into the electrolyte. In addition, document 1 (claims) suggests silicon, tin etc. as an element forming an alloy with lithium, and nickel, copper etc. as an element not forming an alloy with lithium. Moreover, document 1 discloses forming, by electrolytic plating etc., a layer containing a metallic element not forming an alloy with lithium (Par. No. 0052), a method for coating a paste on a current collecting member comprising a metallic element not forming an alloy with lithium and then drying as a method for forming a negative electrode comprising a powder containing a metallic element forming an alloy with lithium (Par. No. 0056), a sponge-like or expanded metal etc. as a current collecting member (Par. No. 0059), 60µm as the thickness of the negative electrode (Par. No. 0131), and extracting an output terminal from a metallic part not forming an alloy with lithium.

Although document 1 does not mention that the metallic element not forming an alloy with lithium possesses fine gaps, from the perspective of forming the front and rear surfaces of the active substance layer and formation by electrolytic plating etc., it is found that the metallic element formed on the front and rear surfaces of the active substance layer possesses fine gaps in the thickness direction so as to contact the electrolyte with the active substance, and because gaps are routinely formed in an active substance layer after drying a paste, it is found that, by electrolytic plating, plating is achieved even in the gaps in the active substance and an electrically-conducting path is formed.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

Claim 5 does not appear to involve an inventive step based on documents 1 and 3 cited in the ISR.

Document 3 discloses making the thickness of the current collecting core provided on the surface of active substance layer 2-8 $\mu$ m, and that it is possible to increase the energy density of the core by reducing its thickness (Par. No. 0011), and it is found that setting the thickness of the metallic part not forming an alloy with lithium formed on the surface of the active substance layer in the invention disclosed in document 1 to 2-8 $\mu$ m, as disclosed in document 3, or reducing the thickness to a range within which the mechanical strength of the electrode would not harm its usability so as to increase the energy density could be easily achieved by a party skilled in the art.

Claim 7 does not appear to involve an inventive step based on document 1 cited in the ISR.

Optimizing the area and ratio of perforation in the gaps of the metallic part not forming an alloy with lithium formed on the surface of the active substance layer in the invention disclosed in document 1 so as to contact the electrolyte with the active substance could be easily achieved by a party skilled in the art.

Claim 12 does not appear to involve an inventive step based on document 1 cited in the ISR.

Making the metallic part not forming an alloy with lithium formed on the surface of the active substance layer in the invention disclosed in document 1 multi-layered could be easily achieved by a party skilled in the art.

Claims 1, 2 and 15 do not appear to involve an inventive step based on document 2 cited in the ISR.

Document 2 (claims) discloses, in an electrode for a lithium secondary battery provided with an active substance layer comprising a metal forming an alloy with lithium on a current collecting layer comprising a metal not forming an alloy with lithium, an electrode provided with a surface coating layer comprising a metal not forming an alloy with lithium on the surface opposite the current collecting layer on this active substance layer.

When using the invention disclosed in document 2 in the electrode of a commonly-known cylindrical lithium secondary battery, providing an output terminal on the current collecting layer comprising a metal not forming an alloy with lithium or on the surface of the surface coating layer comprising a metal not forming an alloy with lithium could be routinely conceived of by a party skilled in the art.

Claims 10, 14 and 16-18 appear to be novel and to involve an inventive step.

The point in claim 10 that the metallic material having low lithium compound forming power contained in the surface layer and the metallic material having low lithium compound forming power permeating through the active substance layer are different materials, the point in claim 14 that the central part in the thickness

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Supplemental Box

Box V

direction has an electrically conductive metallic foil layer, and the point in claims 16-18 that opposing current collecting surface layers are formed on the front and rear of the active substance layer by electrolytic plating on the carrier foil are not disclosed in any of the documents cited in the ISR, nor are they obvious to a party skilled in the art.